

Today's Prelims Topics

Lokpal Act Implementation and Functioning

Context

The Foundation Day of the Lokpal of India was held for the first time on 16th January at Manekshaw Centre, New Delhi.

About Lokpal

- It is a **statutory body** established under the **Lokpal and Lokayuktas Act 2013** to inquire and investigate allegations of corruption against **public functionaries**.
- **Composition:**
 - **Chairperson** (Retd./Serving Chief Justice of India/ Judge of the Supreme Court or an eminent person who fulfils the eligibility specified in the act)
 - Maximum of **8 Members out of whom 50% are Judicial Members**.
 - At least 50% of Lokpal members should belong to **SC/ ST, OBC, Minorities and Women**.
 - **Tenure: 5 years** or until they attain the age of 70 years, whichever is earlier.
- **Appointment of Lokpal:** The President appoints the Chairperson and the Members on the recommendations of a **Selection Committee consisting of:**
 - **Chairperson:** Prime Minister as Chairperson
 - **Members:** Speaker of Lok Sabha, Leader of Opposition Lok Sabha, Chief Justice of India, one eminent jurist to be nominated by the President on the recommendation of the Chairperson and the members of the Selection Committee.
- **Lokpal (Amendment) Act 2016:** Allows the leader of the largest opposition party in the Lok Sabha, in the absence of a recognized Leader of Opposition, to be a member of the selection committee.

Complaint & Investigation Stats

- **Defect-free complaints registered:** **2,320** over five years (**226 complaints** from April to December 2024).
- **Rejection of complaints:** Nearly **90% of complaints** rejected for not being in the correct format.
- In five years, the Lokpal has: Ordered investigations in **24 cases** & Granted prosecution sanction in **6 cases**.
- **Source of complaints:**
 - **3%** against the Prime Minister, Members of Parliament, or Union Ministers.
 - **21%** against Group A, B, C or D officials of the Union government.
 - **35%** against chairpersons or members of Central government bodies.
 - **41%** against State government officials and others.

Time-Limited Jurisdiction: Complaints are only entertained if filed within **7 years of the alleged offence**. (Section 53 of the Lokpal Act).

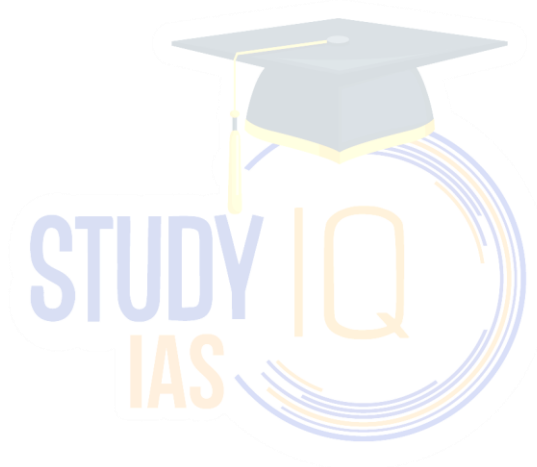
Issues in Functioning of Lokpal

- **Delayed Appointments:**
 - **First Lokpal:** Justice **Pinaki Chandra Ghosh** was appointed in March, 2019, he retired in May, 2022.
 - **Second Lokpal:** Justice **A.M. Khanwilkar (retd)** was appointed in **March 2024**.
- **Director of Inquiry:**

- Key administrative posts, including **Director of Inquiry** and **Director of Prosecution**, remain vacant despite multiple proposals sent to the Union government.
- **Section 11 A of the CVC Act, 2003** mandates the appointment of a Director of Inquiry (rank: Joint Secretary or above).
- In the absence of this post, inquiries are conducted by **Central Vigilance Officers (CVOs)** of relevant Ministries or organisations.
- **Reliance on External Agencies:**
 - Preliminary inquiries and investigations are entrusted to **CBI & CVC**.

Source

- [The Hindu - Lokpal ordered probe in 24 cases in 5 years](#)



Research questions 'iron deficiency' as key cause of anaemia in India

Context

A recent study, published in the **European Journal of Clinical Nutrition**, revisited the causes of anaemia in India and suggested that **factors beyond iron deficiency** also play a significant role.

About Anaemia

- It is a blood disorder that occurs when the body doesn't have enough healthy red blood cells or hemoglobin. This prevents the body from delivering enough oxygen to organs and tissues
- **Current Focus:** Policies target iron deficiency as the primary cause, promoting iron supplementation and food fortification.
- **Contrasting Data:** Despite these interventions, anaemia prevalence in India has worsened, as per the **National Family Health Survey-5 (NFHS-5)** (2019–20).

Key Findings of the study - Causes of Anaemia

- **Iron-Deficiency Anaemia:** Only **9%** of anaemic cases could be attributed to iron deficiency.
- **Unknown Causes:** **22%** of cases were linked to unmeasured or unknown factors, which could include:
 - Deficiencies in **Vitamin B12** or **folate**.
 - **Hemoglobinopathies** (genetic disorders affecting haemoglobin).
 - **Undetected blood loss**.
 - **Unhygienic environments** or **air pollution**.
- **Prevalence of Anaemia: Comparison with NFHS-5:**
 - **Women (15–49 years):** **41.1%** (study) vs. **60.8%** (NFHS-5).
 - **Adolescent Girls (15–19 years):** **44.3%** (study) vs. **62.6%** (NFHS-5).
- **Role of Blood Collection Method: Venous Blood vs. Capillary Blood:**
 - Venous blood tests used in the study provided lower anaemia prevalence rates compared to **NFHS-5's pinprick method**.
 - Pinprick sampling is prone to inaccuracies, which could inflate anaemia estimates.

Source:

- [The Hindu - iron deficiency' as key cause of anaemia in India](#)

ISRO's SpaDeX Mission and the Role of Space Weather

Context

Favourable **space weather** helped ISRO to successfully conduct the docking operations.

What is Space Weather?

- Space weather is the condition in space caused by **solar winds** (streams of charged particles ejected from the Sun's outer atmosphere, the **solar corona**).
- Solar Winds travel at millions of kilometers per hour and influence the space environment.
- **Solar Activity Cycle:**
 - The Sun's activity follows an **11-year cycle**, with activity measured by the number of sunspots.
 - **Current Cycle:** Began in late 2019 and reached its maximum phase in November 2023. Currently, solar activity remains heightened.

Impact of Space Weather on Satellites and Spacecraft

- **Challenges for Spacecraft:** High-energy solar radiation can Blind sensors & Interfere with electronic control systems.
- **Magnetic storms** (e.g., coronal mass ejections or high-speed solar wind streams) can **disrupt communication and cause positional errors in spacecraft**.
- **Precision Docking:** Requires negligible relative velocity and precise alignment of docking ports to avoid collisions or damage.
 - Inclement space weather adds complexities and uncertainties to such tasks.

Role of Space Weather in SpaDeX Success

- **Favorable Solar Conditions:**
 - Despite heightened solar activity in the ongoing **Solar Cycle 25**, the days preceding the SpaDeX mission saw **reduced sunspot activity** and minimal magnetic disturbances.
- **Potential Risks Avoided:**
 - Strong solar flares or magnetic storms could have caused communication loss, sensor malfunctions or positional inaccuracies, complicating docking maneuvers.

Source:

- [Indian Express - Space Weather](#)
- [Indian Express - Role of sun](#)

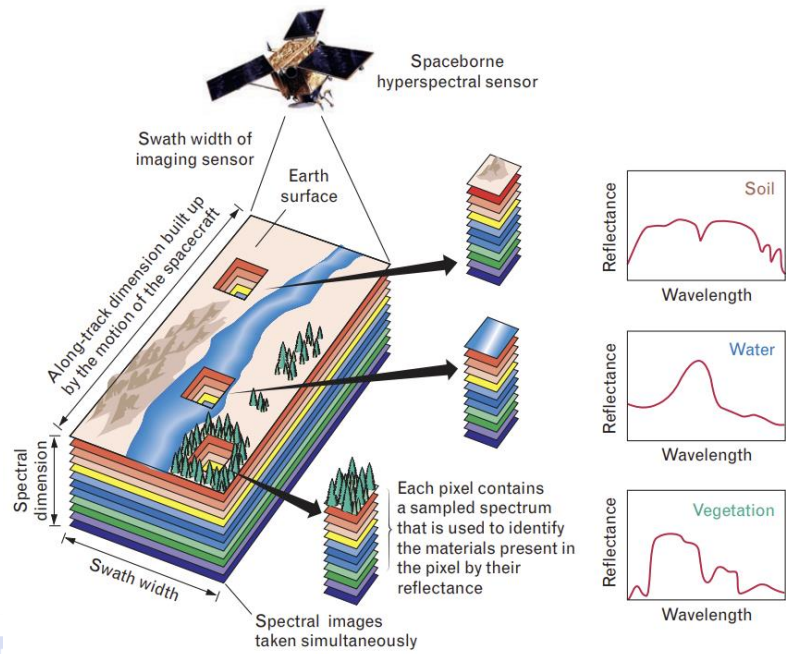
India's first private satellite constellation by PixxelSpace

Context

First three satellites of the Firefly constellation were successfully launched aboard SpaceX's Transporter-12 mission from Vandenberg Space Force Base, California.

About Firefly Constellation

- Firefly is Pixxel's flagship **hyperspectral imaging satellite constellation**, featuring six of the highest-resolution commercial hyperspectral satellites.
- Satellites are designed to deliver critical climate and Earth insights with unmatched precision.
- A **satellite constellation** is a network of identical artificial satellites with the same purpose and shared control, designed to work as a system.



Hyperspectral Imaging Satellites

- Hyperspectral imaging satellites use spectral imaging to analyze objects on Earth from space.
- They can detect a wide range of wavelengths of light, which allows them to see more detail and identify unique spectral signatures.

Source:

- [PIB - private satellite constellation by PixxelSpace](#)

Revised Open Market Sale Scheme (Domestic) Policy for 2024-25

Context

The Union Minister of Consumer Affairs, Food and Public Distribution has announced key revisions to the Open Market Sale Scheme (Domestic) Policy for 2024-25.

About Key Revisions

- **Fixation of Reserve Price for Rice:** The reserve price of rice has been fixed at ₹2,250 per quintal (Pan-India).
 - It is applicable to sales made to: State Governments, State Government Corporations & Community Kitchens.
 - These entities can procure rice **without participating in e-auctions**.
- **Reserve Price for Ethanol Distilleries:** Rice allocated for ethanol production will also have a fixed reserve price of ₹2,250 per quintal (Pan-India).

About Open Market Sale Scheme (OMSS)

- It is a government initiative that aims to **reduce the excess stock of food grains** held by the FCI and state agencies.
- This scheme aims to **control market prices and curbs inflation**.
- Under this scheme, the **FCI sells surplus food grains from the central pool** (especially wheat and rice) **in the open market through e-auctions** to traders, bulk consumers, retail chains and so on **at predetermined prices**.

Food Corporation Of India (FCI)

- Statutory body under the Food Corporation Act, 1964
- **Established In:** 1965
- **Nodal Ministry:** Ministry of Consumer Affairs, Food and Public Distribution.
- **Role:** Execution of food policies of the government.
- **Objectives:**
 - **Effective price support operations** for safeguarding the interests of the farmers.
 - **Distribution of food grains** throughout the country for a public distribution system.
 - **Maintaining satisfactory level of operational and buffer stocks** of food grains to ensure National Food Security.

Source:

- [PIB - Revised Open Market Sale Scheme \(Domestic\)](#)

Russia and Iran Sign Comprehensive Strategic Partnership Treaty

Context

Recently Russian President **Vladimir Putin** and Iranian President **Masoud Pezeshkian** signed a landmark treaty aimed at strengthening their strategic partnership.

Key Focus Areas of the Treaty

- **Economic Cooperation:** Both leaders acknowledged current trade levels as insufficient and aim to boost economic ties.
- **Energy Projects:** Russia and Iran are working on resolving technical issues to ship Russian natural gas to Iran.
- **Transport Infrastructure:** The treaty includes plans to **develop transport corridors connecting Russia to Iranian ports in the Gulf.**
- **Regional Stability and Development:** The partnership is expected to contribute to the sustainable development of both countries and the broader region.

Geopolitical Context

- **Sanctions:** Both Russia and Iran are facing severe Western sanctions, encouraging the need for closer ties.
- **Geopolitical Alignment:** Russia and Iran share common interests in countering U.S. influence in the region, particularly in West Asia.
- **Past Cooperation:** Historical ties include nuclear energy projects and mutual support in Syria and Ukraine.

Source:

- [The Hindu - Russia and Iran sign treaty to deepen their ties](#)

News in Shorts

Grievance Appellate Committees (GAC)

- GAC is an online dispute resolution mechanism that handles appeals from users who are aggrieved by decisions made by social media intermediaries.
- It was established under the **Information Technology (Intermediary Guidelines and Digital Media Ethics Code) Rules, 2021**.
- **Powers:**
 - Decide on content takedown or reinstatement.
 - Overturn account suspensions or 'deplatforming' by social media platforms.
 - GAC's decisions are **binding** on intermediaries.

Source:

- [The Hindu - Social media firms largely compliant with rulings](#)

NATGRID (National Intelligence Grid)

- Delhi Police Commissioner has authorized district Deputy Commissioners of Police (DCPs) to use **NATGRID** for tracking criminals and suspects.
- NATGRID is a database compiled by the **Ministry of Home Affairs** that contains over 24 sets of data to help agencies identify and monitor suspects.
- It contains over **24 sets of data** including: Immigration records, Banking details, Travel history, Phone data etc.
- **Origin: 26/11 terrorist attack in Mumbai, which** exposed the deficiency that security agencies had no mechanism to look for vital information on a real-time basis.
- **Features:**
 - The data repository at NATGRID captures all the digital footprints of an individual or an entity.
 - It offers real-time intelligence about individuals and other entities to law-enforcement authorities across the country.

Source:

- [Indian Express - Top court authorises use of NATGRID](#)

PM lauds Indian space startup Digantara at the success of Mission SCOT

- Recently Digantara launched its **SCOT satellite aboard SpaceX's Transporter-12 mission** to enhance space safety and track Resident Space Objects (RSOs).
- **Mission SCOT is the world's first commercial Space Situational Awareness (SSA) satellite.** It will monitor Low Earth Orbit (LEO) with improved efficiency.
- The mission is backed by Aditya Birla Ventures and SIDBI.
- It will ensure surveillance of objects **as small as 5 cm orbiting the Earth** to ensure safer space operations.

Source:

- [PIB - success of Mission SCOT](#)

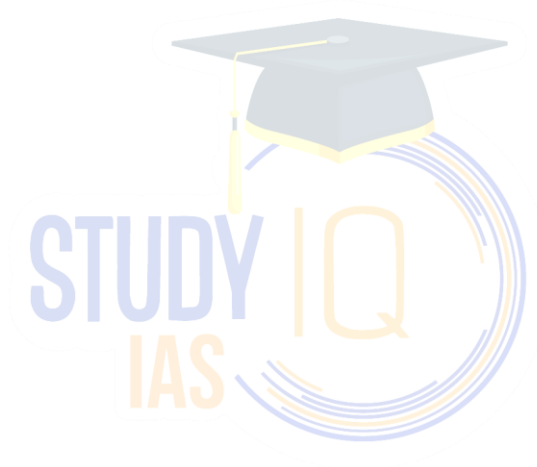
Karnali Hydropower Project

- Indian Renewable Energy Development Agency (IREDA) has finalized a Joint Venture Agreement for the development of the **Upper Karnali Hydro-electric Project in Nepal**.
- **Karnali River:** Originates from **Macha-khabab of Tibet** and flows through Nepal and meets the Ghaghara River in India.

- It is also known as **Mapcha Tsangpo in Tibet.**
- **Karnali Hydropower Project:**
 - It is a Run-of-River project that will **export power from Nepal to India and Bangladesh.**
 - A run of the river project uses the natural flow of a river to generate electricity.
- Karnali hydro-electric project is the **largest hydro-electric power project in Nepal.**

Source:

- [PIB - Upper Karnali Hydropower Project in Nepal](#)



Editorial Summary

Economic Growth

Context

- The First Advance Estimates (FAE) of National Accounts for 2024-25 show a real GDP growth of 6.4% and a nominal GDP growth of 9.7%.
- These numbers have fallen short of the Reserve Bank of India's revised growth estimate of 6.6% for real GDP, as in its December 2024 monetary policy statement and 10.5% for nominal GDP growth as in the 2024-25 Union Budget presented in July 2024.

More In News

- GDP growth in the first half of 2024-25 was **6%**, and the second half is expected to improve to **6.7%**.
- Gross Fixed Capital Formation (GFCF) stabilized around **33.4%** of GDP.
- Incremental Capital Output Ratio (ICOR) is estimated at **5.1** for 2025-26.
- Government of India's capital expenditure for the first eight months was **₹5.14 lakh crore**, just **46.2%** of the annual budget target of ₹11.1 lakh crore.
- **Gross Tax Revenue (GTR)** growth for the first eight months was **10.7%**, with a buoyancy of **1.1**, higher than the budgeted 1.03.

Facts

- India's real GDP growth is projected at **6.5%** for the next five years, as per the international monetary fund (IMF.)
- Nominal GDP growth is expected to be in the range of **10.5%-11%**, with inflation (IPD) at **4%**.

Dip in GDP Growth

- **High Base Effect:** The growth of **8.2%** in 2023-24 created a high base, making the subsequent year's growth appear slower.
- **Government Spending and Slowdown:**
 - **Capital Expenditure (Capex):** The Centre spent only 46.2% of the annual capex target by November 2024, compared to 58.5% in the previous year.
 - States utilized only ₹0.88 trillion of the allocated ₹1.5 trillion for capex.
 - Revenue expenditure grew by just 1% year-on-year, failing to offset slow capex growth.
 - **Interest payments consume 19% of the Centre's expenditure**, constraining fiscal flexibility.
- **Private and Corporate Investment:** Private corporate savings increased to 10.7% of GDP post-2005-06, yet fixed capital formation declined to 21.5% (2015-2021) from 27.5% in 2007-08.
 - Corporate investment remains weak despite tax cuts.
- **Manufacturing and Global Uncertainty:** Manufacturing growth **fell to 5.3% in 2024-25 from 9.9% in 2023-24.**
 - Global trade uncertainties and weak external demand added to domestic challenges.
- **Agricultural Supply Chain Issues:** Rising demand for processed foods and milk products coincided with inefficiencies in vegetable supply chains, leading to price spikes.

What Needs to Be Done

Government Spending and Fiscal Policy

- **Accelerate Capital Expenditure:** Boost capex growth to at least 20% in 2025-26 to crowd in private investment and stimulate economic activity.

- Focus on high-multiplier sectors such as infrastructure, healthcare, and renewable energy.
- **Improve Spending Quality:** Prioritize public investment over revenue expenditure to ensure effective stimulus.
 - Maintain fiscal consolidation by reducing the fiscal deficit and lowering interest payments.
- **Incentivize State Investments:** Continue conditionalities that encourage states to increase their capital expenditure.
- **Tax Reforms:** Introduce a tax on corporate non-business income, offset with an investment tax credit, to channel resources into productive sectors.
 - Reduce income taxes for lower slabs to enhance consumption and spending.
 - Simplify the tax structure by removing loopholes and broadening the tax base.

Investment and Business Environment

- **Encourage Private and Public Investment:** Address structural constraints to revive corporate fixed capital formation.
 - Design targeted incentives to promote investment in employment-generating sectors.
- **Simplify Regulations:** Extend reforms to local governance levels to ease regulatory complexities for businesses.
 - Leverage state competition for Global Capability Centres (GCCs) through business-friendly policies.

Agricultural Reforms

- **Crop Diversification and Marketing:** Promote diversification away from MSP-dependent crops, as diversified production leads to higher profits.
 - Facilitate private markets and direct farm gate sales.
 - Strengthen agricultural supply chains and address inefficiencies in food logistics.
- **Focus on Food Supply Stability:** Develop unified policies to stabilize vegetable and food prices.

Monetary Policy and Demand Stimulation

- **Lower Interest Rates:** As inflation subsides, reduce real interest rates to incentivize housing and durable goods purchases.
 - Use lower borrowing costs to spur demand, particularly among India's younger population.
- **Align Budget with Production Needs:** Design budgetary policies to improve production conditions, enabling higher output at lower costs.
 - Prioritize well-designed incentives over mere resource allocation.

Sources:

- [The Hindu: India's real growth rate and the forecast](#)
- [Indian Express: incentives, not just resources](#)

India-Taliban Engagement

Context

India's Foreign Secretary Vikram Misri led a delegation of senior Indian diplomats at a substantive meeting in Dubai with Amir Khan Muttaqi, Foreign Minister of the second Taliban regime.

Relationship Over the Years

India's engagement with the Taliban has evolved incrementally since the group's resurgence in 2021. Despite historical reluctance due to the Taliban's close ties with Pakistan and its policies toward women and minorities, India has gradually adapted its approach to the changing realities on the ground in Afghanistan.

Initial Reluctance and Assessment (2000)

- In 2000, following a meeting between India's High Commissioner to Pakistan, Vijay K Nambiar, and Taliban envoy Mullah Abdul Salam Zaeef, Nambiar assessed the possibility of engaging with the Taliban as bleak.
- He recognized that the Taliban were **deeply entrenched in Pakistan's sphere of influence**, making serious engagement difficult for India.
- This assessment was rooted in the **ideological and political distance** between India and the Taliban.

First Contact Post-U.S. Withdrawal (August 2021)

- **August 2021:** As the U.S. military withdrew and the Taliban took control of Kabul, India initiated its first official contact with the new Taliban government.
 - India's Ambassador to Qatar, Deepak Mittal, met Sher Mohammad Abbas Stanekzai, head of the Taliban's political office in Doha.
 - This meeting was driven by the Taliban's request and their intent to maintain ties with India.
- India emphasized its concern over the Taliban's exclusionary cabinet and lack of representation for ethnic minorities and women.
 - However, the Taliban reassured India that it would be "reasonable" in addressing India's concerns.

Humanitarian Aid and Diplomatic Engagement (2021-2022)

- **September 2021:** India acknowledged the Taliban as the de facto power in Afghanistan, referring to them as "those in positions of power and authority".
 - India took the step of sending 1.6 tonnes of essential medicines to Afghanistan.
- **December 2021:** India sent humanitarian aid to Afghanistan, reinforcing its intent to differentiate between the Taliban government and the Afghan people.
 - This included essential medical supplies and contributions after the deadly earthquake in Khost and Paktika.
- **June 2022:** India sent a delegation led by Joint Secretary J P Singh to Kabul to oversee the distribution of aid.
 - The delegation met with Taliban Foreign Minister Amir Khan Muttaqi, marking the first official visit from India to Kabul since the Taliban took over.
- **2022-2023:** India continued to support Afghanistan with humanitarian aid, focusing on food, medical supplies, and essential commodities.
 - India also stationed a "technical team" at its Kabul embassy to oversee the aid operations.

Shifting Diplomatic Stance (2022-2024)

- **December 2022:** India expressed concern over the Taliban's decision to ban women from attending universities and reiterated its call for an inclusive government that respects women's rights.
 - India remained focused on Afghanistan's humanitarian needs while continuing to urge the Taliban toward more inclusive governance.
- **October 2023:** The Afghan embassy in New Delhi ceased operations, citing resource shortages, marking a decline in diplomatic interaction.
 - Despite this, Afghan diplomats in India continued to manage the mission.

Engagement Resumes in 2024

- **January 2024:** Indian diplomats in Kabul held their first high-profile meeting with Taliban Foreign Minister Amir Khan Muttaqi.
 - The meeting indicated a further thawing of relations and a shift towards more structured engagement.
- India's cautious approach focused on ensuring that no anti-India terrorist activities were allowed from Afghan soil.
- The discussions also revolved around Afghanistan's rebuilding efforts, where India's involvement was welcomed by the Taliban, especially in areas like infrastructure.

India's Core Concerns and Strategic Calculations

India's engagement with the Taliban has been motivated by several factors:

- **Security:** India remains highly focused on preventing Afghanistan from becoming a haven for anti-India terrorist groups.
- **Geopolitical Dynamics:** With China, Pakistan, and other regional players making inroads into Afghanistan, India has sought to maintain its influence in the country.
 - India has also been careful not to be left behind as Afghanistan's infrastructure and trade relationships evolve.
- **Humanitarian Support:** India has been a significant provider of humanitarian aid, which aligns with its longstanding policy of supporting the Afghan people.

Outlook and Challenges

- **Visa and Trade Ties:** In 2024, the Taliban requested India to issue visas for Afghan businessmen, students, and patients, but logistical and security challenges remain.
 - India has also committed to reviving stalled development projects in Afghanistan, which could enhance bilateral ties further.
- **Political Engagement:** Despite India's growing pragmatic approach, it continues to avoid formally recognizing the Taliban government.
 - However, New Delhi is prepared to engage in a practical manner, balancing its security concerns with its humanitarian and strategic interests in the region.

Source: [Indian Express: Engaging with the Taliban](#)

Detailed Coverage

Rat Hole Mining

Context

On January 6, 2025, a rat-hole mine in Assam's Dima Hasao district was flooded, trapping nine men.

More Incidents

- In December 2018, at least 15 men were trapped in an illegal mine in the neighbouring state of Meghalaya after water from a nearby river flooded it.
- In January 2024, six workers died after a fire broke out in a rat-hole coal mine in Nagaland state.

About Rat Hole Mining



- Rat-hole mining is a primitive and hazardous method of coal extraction prevalent in certain regions of India, notably Meghalaya.
- This technique involves digging narrow tunnels, often only 3 to 4 feet in diameter, into the ground to reach coal seams.
- Miners, sometimes including children, crawl through these confined spaces to manually extract coal using basic tools.
- There are two primary types of rat-hole mining:
 - **Side Cutting:** Narrow tunnels are dug horizontally into hill slopes until the coal seam is reached.
 - **Box Cutting:** A rectangular opening is made on the surface, leading to a vertical pit that reaches the coal seam. From this pit, horizontal tunnels are dug to extract coal.

Government Action

- **NGT Ban in 2014:** The **National Green Tribunal (NGT)** banned rat-hole mining in Meghalaya in 2014.
 - The ban was due to the unsafe and unscientific nature of this mining method, as well as its detrimental environmental and social impacts.
- **Supreme Court Ruling in 2019:** The Supreme Court, while upholding the ban on unregulated rat-hole mining, stated that coal mining could be conducted in Meghalaya if it complied with:
 - The **Mines and Minerals (Development and Regulation) Act, 1957 (MMDR Act)**.
 - The **Mineral Concession Rules, 1960**.

- Despite being banned, rat-hole mining continues illegally in North Eastern regions.
 - E.g., the Assam government has detected 220 rat-hole coal mines in the Dima Hasao district's Umrangso area.

What are the Reasons For Its Prevalence?

- **Less Government Control:** The Coal Mines Nationalisation Act of 1973 does not apply, allowing local communities to extract and sell coal without external restrictions.
 - E.g., In Meghalaya, a Sixth Schedule state, land and minerals are owned by tribal landowners, limiting government control.
- **Economic Incentives:** Mining provides higher earnings for laborers compared to farming or construction work, attracting workers from neighboring areas like Assam, Nepal, and Bangladesh.
- **Geographical Factors:** The state's hilly terrain and thin coal seams make conventional mining methods impractical.
 - Rat-hole mining is cost-effective and requires minimal machinery, suiting the local geography.

Issues Associated with Rat-Hole Mining

- **Environmental Degradation:**
 - **Land Degradation:** Large-scale deforestation and unscientific mining leave the landscape barren and unproductive.
 - **Water Pollution:** Acid mine drainage contaminates rivers and streams, making them acidic and unfit for aquatic life.
 - E.g., The Lukha and Myntdu rivers in Meghalaya.
 - **Loss of Biodiversity:** Mining activities disrupt local ecosystems and destroy habitats of endemic species.
- **Health and Safety Hazards:**
 - **Unsafe Working Conditions:** Miners, including women and children, work in cramped, poorly ventilated shafts, risking asphyxiation and collapse.
 - **Frequent Accidents:** Lack of structural support often leads to mine collapses, flooding, and fatalities.
 - E.g., The **2018 Ksan mining tragedy** in Meghalaya claimed 17 lives.
 - **Health Risks:** Continuous exposure to coal dust and toxic gases can lead to respiratory diseases and long-term health issues.
 - E.g., Asphyxiation.
- **Labor Exploitation:**
 - **Child and Migrant Labor:** The practice often employs underage and migrant workers, exploiting their economic vulnerability.
 - **Low Wages and Poor Living Conditions:** Despite earning more than farm jobs, miners often face exploitative contracts and unsafe living conditions.

Way Forward

- **Livelihood Development:** Implementing programs that provide alternative sources of income is crucial.
 - This can include skill development initiatives aimed at diversifying employment opportunities beyond mining, such as promoting tourism, agriculture, or handicrafts. Programs like the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) can be leveraged to create job opportunities for those reliant on rat-hole mining.
- **Micro-Financing:** Establishing micro-financing options can empower local entrepreneurs to start small businesses, reducing dependence on mining activities.

- **Mechanized Mining Techniques:** Research and investment in safer, mechanized mining methods suitable for extracting coal from thin seams can enhance safety and efficiency.
 - Techniques such as bord and pillar mining or small-scale mechanized mining could replace the hazardous rat-hole method.
- **Safety Innovations:** Developing and implementing safety technologies for existing mining practices can help mitigate risks.
 - This includes better ventilation systems and structural supports in mines.
- **Stricter Enforcement:** Strengthening law enforcement to ensure compliance with existing bans on rat-hole mining is essential.
 - This includes imposing harsher penalties for illegal operations, which persist despite regulatory frameworks.
- **Community Involvement:** Engaging local communities in monitoring and decision-making processes regarding mining activities can foster accountability and promote adherence to regulations.
- **Safety Training Programs:** Providing robust training on safety practices for miners can significantly reduce accidents and fatalities associated with rat-hole mining.
 - Awareness campaigns about the dangers of this method should also be conducted to inform local populations about safer alternatives.

Sources:

- [The Hindu: Dying for Black Gold](#)
- [The Hindu: Understanding rat-hole mining](#)
- [Mongabay: Meghalaya's black holes: Unregulated rat-hole coal mines ravage environment](#)

